

# Second International Conference of Human Genetics

## The Conference

**T**HIS NOTABLE CONFERENCE, in the spacious premises of the Food and Agriculture Organization of the United Nations, opened in Rome with speeches and a reception at the Campidoglio on the evening of September 6th, 1961. The succeeding days, up to and including September 12th, were fully occupied with morning and afternoon sessions held in three parallel series of invited and contributed papers. The evening entertainments and receptions, and the Conference publications and printed ephemera, were all of a lavishness and style suitable to the eternal city. Rome, when climatically temperate as it was, can scarcely be bettered anywhere for conferences of a technical nature where yet the participants are awake to beauty and culture in other fields.

Professor Luigi Gedda, the Conference President and creative magician, must receive the thanks of all for his magnificent success in organization, and likewise the munificence of the City of Rome, the Italian Government and the Vatican must be promptly acknowledged.

The total membership of the Conference was around 700, and many members were accompanied by a spouse whose interests lay outside genetics. Thirty-one nations were included, led by the U.S.A. with 184 representatives, the U.K. with ninety and Italy with seventy-three.

## The Substance of the Conference

The originally proposed title of the Conference had included the words "and Eugenics," but this tailpiece had been dropped without explanation during the months preceding. There was no antagonism to eugenic interests, papers or ideals, but the emphasis lay elsewhere because, in truth, interest as yet is mainly elsewhere.

Human genetics, one was forced to recognize more fully than ever, is still very largely in the

descriptive phase of its evolution as a particularized science. That description is centred upon living cells, personal traits, visible symptoms and so on. Many seethe with descriptive excitement based upon the modern analysis of blood groupings, or the new techniques for making clearly visible human chromosomes and their anomalies which can then be correlated with symptomatic phenomena in living persons. Twin studies, too, are still the mode of dissecting and describing phenomena where genetic and environmental influences are tangled.

The obvious stress, among so many geneticists, upon the abnormal is understandable. It is easier at this stage of knowledge to describe and study defined abnormalities, fairly discrete symptoms and appearances, than it is to analyse the background to those variations included in normality. Genetics, not circumscribed by the adjective "human," is now in a very different state. The greater ease of experiment and the sense of purpose engendered by the controlled evolution of domestic animals and plants, have led standard geneticists towards both the normal and the future. Non-human genetics is well advanced from the descriptive phase to the practical and immediately advantageous.

In his opening address Professor F. J. Kallman stressed that little sense of responsibility, except in the realms of radiation hazards and personal counselling, has yet overtaken human geneticists. The exclusion of eugenics from the Conference title is simply a facing of this unfortunate fact. Perhaps a subsidiary factor is the emotion so often aroused by the discussion of the genetics of mental traits, intellectual potentialities and their attempted measurement, and the passage of abilities and abnormalities alike from the present into the future. Descriptive and anatomical human genetics escape such emotional overtones.

The fact that moral issues, via radiation

hazard, begin now to afflict human geneticists, may perhaps encourage those among them who already see the moral issues which are inseparable from population limitation among the myriads of diverse humanity.

### Contributions

The Eugenics Society was well represented at the Conference and there were speakers in many varied sections and on many topics. Elder Statesmen of the *Society* including Sir Ronald Fisher and Professor R. Ruggles-Gates; J. A. Fraser Roberts, who was a Chairman of Sessions and other members of the *Society's* Council—J. M. Tanner, P. R. Cox, C. O. Carter, A. E. Mourant, H. Lehmann, E. T. O. Slater and A. C. Stevenson—all made their contributions, the last as representative of W.H.O. Additionally there were papers from other Fellows of the *Society*, from A. W. F. Edwards, a recent Darwin Research Fellow, R. F. J. Withers and from the General Secretary.

The style of presentation of papers generally was most varied and sometimes disappointing. Indeed the technique of presentation and delivery often fell short of what it ought to have been. Happily, however, it may be recorded that this criticism did not apply to the British contributions which were, almost all, models of suitable compression and brevity. There was realization of the good sense—seemingly not understood by all too many others—of the rule that contributions should be limited to fifteen minutes spoken at not more than 100 words a minute. The simultaneous translators and those born to non-European languages were most grateful to those who recognized these points. So were those Chairmen who remained conscious of their duty to check the over-voluble.

All Conference members were provided with two bulky volumes of advance Abstracts in four languages.\* All contributions to the Conference are later to be published in full.

The gallery of exhibits, mostly in illustration

of particular papers, included a table bearing some of the Eugenics Society's post-war publications.

### Radiation Hazards

On private initiative, an attempt was made to induce the Conference to pass a resolution that, in this time of peril by nuclear warfare, a sperm bank be set up which should be protected from harmful radiation, and which should be extended to include dedicated human volunteers and animal specimens. A draft resolution to this effect was negatived, with many abstentions; but a continuing committee to investigate possibilities in more considered detail was asked to report later.

The Conference did, however, pass unanimously a resolution on the hazards of ionizing radiation. A form of words was adopted which, signed on behalf of the Conference by Penrose, Boyes, Kallman and Gedda, will be sent at once to all national governments.

A convincing feat of oratory was also performed by the Deputy-Director of Euratom at the formal closing session of the Conference when he drew attention to the special need for people well versed in physics and biology together and not one or the other discipline alone.

### Third Conference

The Conference agreed a plan for the organization of its successor, probably in 1965. Plans are to be in the hands of the six-man Standing Committee with whom will be associated twelve others elected by the Conference on a regional basis.

### SOME CONTRIBUTIONS

The following summaries of a variety of papers are based on the printed abstracts of the Conference, and Dr. C. O. Carter's report in *The Lancet*.\*

E. SILVERSTRONI (Rome) described the development of the first large-scale attempt at negative eugenics through counselling. He estimated that there were two million individuals

\* These volumes have now been separated by Excerpta Medica Foundation into single-language parts and are published as *Excerpta Medica: International Congress Series*, No. 32. The English version is obtainable from the Secretary, Excerpta Medica Foundation, 67c New Bond Street, London, W.1 (Pp. 187, Price 40s.)

\* 23.6.61—by permission

in Italy heterozygous for the gene responsible for Cooley's anaemia, resulting in the death of 1,000 homozygotes a year. By "pre-matrimonial prophylaxis"—that is, dissuading heterozygotes from marrying each other—these deaths were preventable. Centres now established in many areas in Italy were engaged in testing every child in the elementary schools for heterozygosity.

R. B. CATTELL (Urbana) described the partition of the variation observed in intelligence and other personality traits into genetic and environmental variation, and the interaction of genes and environment, by a "multiple abstract variance analysis." Like other observers, he found about three-quarters of the variation in intelligence test score to be due to genetic variation. Similarly hereditary factors were more important for excitability, the cyclothymic-schizothymic scale, and super-ego strength. Tendermindedness versus toughmindedness, and general inhibition, were largely environmentally determined. Such assessment applied only to the particular culture being studied.

C. S. FORD (Harwell) noted that five years ago Tjio and Levan had announced almost apologetically that man had 46 and not 48 chromosomes. To-day we knew of seven forms of anomalies of the sex chromosomes, eleven types of chromosome mosaicism, three types of autosomal trisomy, and several examples of chromosome translocation. It was remarkable that whereas with trisomy 21 (Downs' syndrome) about half the offspring also had Downs' syndrome, the ten known children of women with trisomy of the X chromosomes were all normal.

K. PATAU and his colleagues (Wisconsin) suggested that many patients with multiple anomalies might be instances of partial trisomy and that each main anomaly was due to the presence in triplicate of a specific "trisomy locus."

Discussing natural selection and human chromosomal aberrations, L. S. PENROSE (London) noted that while those heterozygous for a translocation had reduced fertility, those homozygous for such translocations might have normal fertility. There were no clear instances of chromosome inversion in man, but

in *Drosophila* chromosome inversion might be associated with super-fertility.

J. V. NEEL (Michigan) emphasized the importance of polymorphic systems in which a number of alleles at a gene locus were present in the population, at a frequency which could not be attributed to mutation pressure, and therefore presumably had adaptive significance. At many gene loci there might be an optimal level of heterozygosity, and many malformations of ill-defined genetic basis might be due to the patient's failing to reach a level of heterozygosity obligatory for normal development. Heterozygosity could lead to the production of hybrid molecules and not just to the mixture of two molecules. Thinking along these lines, several authors had reported studies on the effect of race-crossing, which might be expected to increase heterozygosity, and of inbreeding, which might be expected to reduce it.

With regard to the social problem of differential fertility in civilized communities, J. V. HIGGINS and his colleagues (Minneapolis), in a large family study of the intelligence of both parents and their children, found that there were more children per family for parents with I.Q.s of above 130 and below 70 than for those in between. But the large family size of parents of low I.Q. was balanced by the finding that many of the sibs of these parents were childless.

C. O. CARTER (London) reported that a disquieting feature of the social scene in north-west European countries and north America had been the negative correlation of social class and educational status, with fertility. Because of the considerable degree of educational opportunity, and social mobility, in these countries it was probable that this association resulted in the loss of genes predisposing to the development of socially valuable qualities, including intelligence. The Scottish surveys of 1932 and 1947 showed that the gains in height and weight known to have occurred over this period had not been paralleled by any appreciable gain in intelligence.

The association might be attributed to the practice of deliberate planning of family size being adopted first by the more intelligent and capable parents, while those less gifted tended still to have natural families. It might be expected

to disappear as the practice of planning family size spread through the community.

Recently there had been encouraging signs that not only was the association disappearing, but it was tending to be reversed within the section of the community in which family size was planned. In the 1951 Census of England and Wales it might be seen that men in Social Class I had a higher fertility than men in any other non-manual occupation. In the United States the 1951 Census showed a marked reduction in differential fertility by social class and educational status when compared with that seen in the 1941 Census. In Sweden an admirable follow-up of national service recruits of 1944 indicated that, except perhaps at the lowest level, there would be a positive correlation between ultimate fertility and intelligence test score at the time of recruitment to national service.

It was suggested that when family planning was complete in these countries there would be positive selection for genes predisposing to intelligence, and perhaps other socially valuable qualities, at least as intense as that obtained, with high natural fertility and high infant mortality, up till ten to fifteen generations ago.

P. R. COX (London) said that the main aim of his paper was to present some recent statistics, collected from a variety of sources, to illustrate the speed with which the composition of human populations was changing as they grew. Many of the more important changes were associated in some way with genetic differences. The most obvious and well-known divergencies were those occurring in the world as a whole, between races, continents and nations, but equally striking developments were occurring in some individual countries in which different races and other groups were becoming more or less dominant in number.

His paper concluded with a brief reference to the desirability or undesirability of the trends indicated and the extent to which it might be envisaged that agreement on a course of action to encourage the desirable and discourage the undesirable might be attained.

H. J. MULLER (Indiana), whose paper was read for him in his absence, described how modern medical and other techniques, by enabling

practically everyone to live and breed *ad lib*, had abandoned man's genetic constitution to a chaotic interplay of individual circumstances and caprices, allowing a continued accumulation of diverse genetic impairments. How could this threat to our most precious heritage be met?

Authoritative control, with its debased values, class and race biases, and personal infringements, would institute consciously directed degradation. But in a democracy, measures intentionally encouraging or discouraging childbearing in given sectors of the population would not be tolerated. True, individual genetic counselling could somewhat reduce the production of definite abnormalities. Nevertheless, in the far larger matter of bringing about an overall positive correlation between size of family and the multiple-factor basis of better health, intellect, and character, genetic enlightenment and moral suasion were likely to defeat their own purposes. For the more capable and conscientious were the very persons who, recognizing their short-comings, would oftenest curtail their families, while the others reproduced relatively faster.

This dilemma was circumvented by the broadening of the possibilities of reproduction afforded by modern techniques of germcell storage and introduction. Thereby, couples actuated by more enlightened ethical standards and aided by genetic counselling, would be enabled to choose voluntarily when they so desired, the sources of germinal material for their family. Although those already better endowed would oftener utilize such opportunities, they could usually find still better genetic material. This procedure would provide a genetic leaven in the population. Moreover, the more poorly endowed, influenced by these examples, would increasingly elect to make similar privileges available for their own families. Herewith the proper psychological imperatives for determining marriage choice and family size, namely, compatibility and love of children, achieved still ampler scope yet the genetic constitution became increasingly influenced in the direction of man's higher values.

G. C. L. BERTRAM (Cambridge) said that population was increasing rapidly, primarily

as a result of benevolent effort and the increase was neither planned nor uniform.

The world population to-day was not merely the past population multiplied. Growth had occurred at widely varying rates at different periods. The same process continued to-day, though now individual control of reproduction was an added complication that was spreading fast, with the growth of a new personal freedom. Hence, although world population forty years from now was likely to double, it would not be merely doubling of the population of each area. There would be variations irrespective of any population policies developed by the nations.

Similarly, within populations all would not contribute equally to the increase. There would be no special significance in these observations if all people were identical. But there were great variations of inherited attributes within populations and between populations. Genetic variety was of course sharpened or modified by environmental factors, educational, traditional, sociological and so on. So long as there was suitable adjustment to environmental demands precise anatomical details—skin pigmentation, etc.—mattered little. Physiological superiority might come to matter more, however, under progressively crowded conditions.

Yet diversities dependent upon those genetic factors which determined intellectual ability, vigour, pugnacity, etc. were far more important already, and likely to be more so in the future.

World problems were likely to get more and not less difficult, and, within all populations it became progressively more important to upgrade human inherited capacities of the desired kind. Such upgrading was scarcely assured if left to chance, though chance would long have influence. The new freedom of personal planning in reproduction was spreading, but it must be spread universally and with speed. This was because we had a regard for individual welfare within the complex interrelationship of needs and numbers. But would that lead to higher mean ability within populations? Or would an overall plan not come to be essential?

J. A. FRASER ROBERTS (London), in introducing from the Chair the Symposium on Methods in Human Genetics, said that in general, though with some notable exceptions, human genetics

had to be content with a relatively small part of what could be discovered under experimental conditions. Even in achieving this much, however, the methods used were necessarily more complicated both in the assembling of the data and then in their analysis. A wide diversity of techniques was needed, so varied indeed that it was difficult to summarize or classify them. In recent times consideration of the methods used in the collection of data had perhaps been somewhat neglected in comparison with the elaboration of statistical techniques used in their analysis. This was not so in the field of epidemiology, in which many analagous problems arose.

Appropriate planning in the collection of data might simplify subsequent analysis, though usually at the cost of sacrificing the number of those subjects potentially available. This, however, might be well worth while with conditions which were not unduly rare, and of course in the study of normal differences. For example, it was sometimes better to confine attention to close relatives and to those living within some defined geographical radius, and to set other limits of exclusion, with the result that for the same amount of effort more data were obtained and what was even more important, with a nearer approach to completeness in sampling. Again, with conditions which were not too uncommon, empirical figures for risk of recurrence could be based simply on subsequent children, ascertainment being through the affected child, or second affected child, as was appropriate.

The ascertainment of the frequencies in the population of abnormal genetic or partly genetic conditions was fundamental. We could never have too much information on incidence in relation to geography, sex, age and numbers of other variables. Breeding systems and the consequences arising from their differences and changes were of the greatest importance; and it might be that more than the simple coefficient of inbreeding was required. Twin studies still held much promise for the future and in this field a variety of special methods had been evolved. The study of linkage had been greatly facilitated by the development of adequate statistical techniques and advances need

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only await the assembling of suitable data. In the fitting of Mendelian ratios more remained to be done in improving the efficiency of statistical methods. But it was probably in the study

of common conditions in whose causation heredity played some part that preoccupation with improved methods could be most profitable in the immediate future.

